

**THE AUSTRALIAN BASELINE SEA LEVEL
MONITORING PROJECT**

MONTHLY DATA REPORT

SEPTEMBER 2003



This report was prepared under the Australian Greenhouse Science Program for the Australian Greenhouse Office, supported by NTF Australia at the Flinders University of South Australia.



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Quality Certification:

I authorise the issue of this Australian Baseline Sea Level Monitoring Project Monthly Data Report for September 2003 in accordance with National Tidal Facility Australia Quality Assurance procedures.

William Mitchell
A/Director - National Tidal Facility Australia

The Australian Baseline Sea Level Monitoring Project

Monthly Data Report

SEPTEMBER 2003

NOTES ON THE DATA FOR SEPTEMBER 2003

Sea level data return in September was excellent for most stations with the exception of Cape Ferguson where the tide gauge was de-commissioned (for about one month) for wharf maintenance by the Queensland EPA on the 8th.

The residuals (Figures 2 and 3), or difference between the observations and the tidal predictions, are the non-tidal components of the sea level observations. The residuals are primarily the consequence of short-term meteorological effects (Figures 5 and 9).

Wind speed and wind gust data from Stony Point was erroneous (intermittently) throughout September. The wind data (including wind direction) from Cocos Islands was also erroneous in September. These erroneous values and the corresponding incident wind directions have been removed (Figures 4, 5 and 6). At Groote Eylandt the air and water temperature and wind direction sensors (all on the same circuit) continued to record erroneous values (Figures 7 and 8). The data for these three sensors have been removed from the record (hence no incident wind data also).

The sea level anomalies (Figure 10) changed from positive to negative at Rosslyn Bay and from negative to positive at Port Stanvac, Portland, Lorne, Stony Point, Burnie, Spring Bay, and Port Kembla. The sea level anomalies continued to be negative at all other sites in September.

The barometric pressure anomalies continued to be positive at Cocos Islands and changed from negative to positive at Cape Ferguson. The barometric pressure anomalies remained negative at the other sites in September.

It is difficult to relate the water and air temperature anomalies (Figures 12 and 13) directly to those of barometric pressure and sea level without considering other effects, such as localised currents, wind speeds and directions. The anomalies are primarily used to quality control the water and air temperature data.

Figure 14 compares the mean, maximum and minimum values for air temperature, water temperature and barometric pressure for the current month with the long-term September values. Note that the long-term ranges are calculated using the historical sets of September data for each station *excluding* the current month of data.

For all stations the mean air temperatures in September 2003 were generally consistent with the long term September means. The minimum air temperature at Cocos Islands (20.4°C), Darwin (20.5°C) and Rosslyn Bay (12.9°C) was lower than the previously recorded minima. The maximum air temperature at Cocos Islands (30.7°C) and Thevenard (31.7°C) was higher than the previously recorded maxima.

The mean water temperature recorded at all sites in September 2003 was generally consistent with the long-term September means. The minimum water temperature at Cape Ferguson (21.1°C) was lower than the previously recorded minima. Maximum water temperature at Darwin (32.7°C) exceeded the previous record maxima.

The mean barometric pressure at most sites was consistent with the long-term September means with Port Kembla (990.8hPa) recording a record minimum barometric pressure.

Figure 16 shows the monthly mean sea levels with respect to an arbitrary fixed offset from the zero of the tide gauge. This plot clearly shows significant correlation in seasonal signals between stations, in contrast to the sea level anomalies plot (Figure 10), which has the seasonal signal removed from the data.

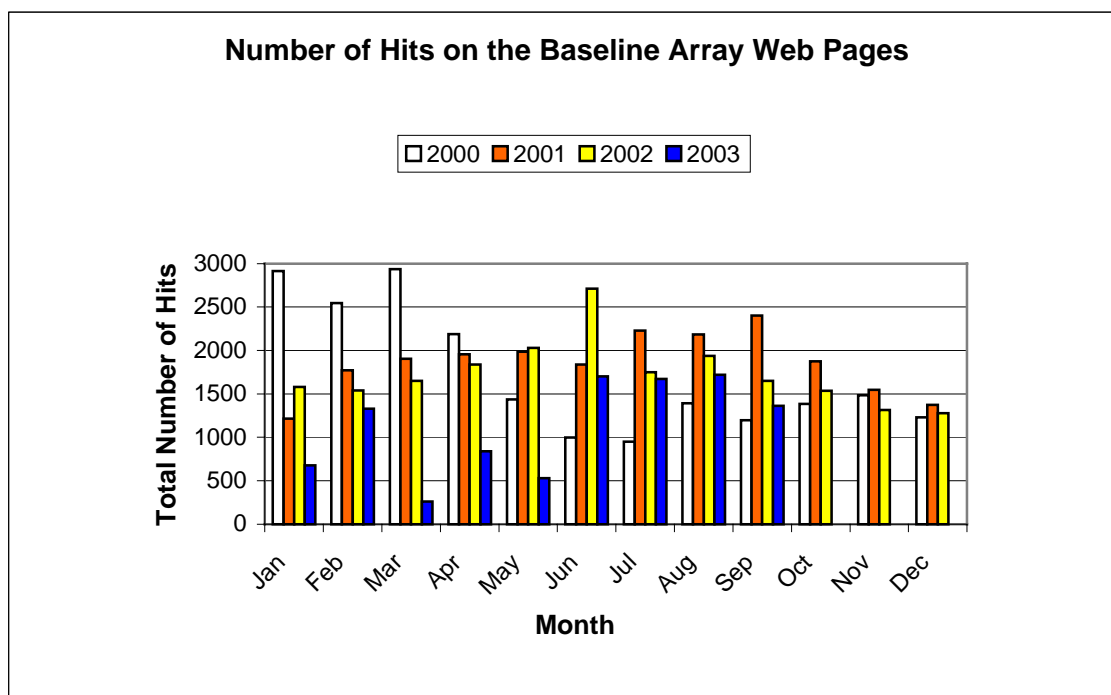
Figure 17 shows the short-term sea level trends for each SEAFRAME location included in the Australian Baseline Sea Level Monitoring Project. Table 1 lists the commencement of operation, the sea level trend for the entire record (plotted in Figure 17) and the change in trend with respect to the analysis of the previous month.

Table 1: Tide gauge installation dates, short-term sea level trends and change in trend from the previous month for the Australian Baseline array to September 2003.

Location	Installation Date	Sea Level Trend (mm/yr)	Change from previous month
Cocos Islands	Sep 1992	+12.6	-0.5
Groote Eylandt	Sep 1993	+15.3	-0.3
Darwin	May 1990	+11.8	-0.2
Broome	Nov 1991	+15.1	-0.3
Hillarys	Nov 1991	+11.9	-0.1
Esperance	Mar 1992	+8.7	0.0
Thevenard	Mar 1992	+6.9	0.0
Port Stanvac	Jun 1992	+7.6	+0.2
Portland	Jul 1991	+3.7	+0.2
Lorne	Jan 1993	+3.0	+0.4
Stony Point	Jan 1993	+2.6	+0.4
Burnie	Sep 1992	+4.4	+0.2
Spring Bay	May 1991	+4.1	+0.3
Port Kembla	Jul 1991	+5.8	+0.2
Rosslyn Bay	Jun 1992	+4.7	-0.1
Cape Ferguson	Sep 1991	+6.0	0.0

The number of hits to the Australian Baseline Sea Level Monitoring project web pages from 2000 to September 2003 is given in Table 2.

Table 2: Number of hits on the Australian Baseline Sea Level Monitoring Project web pages from 2000 to 2003.



Please note: Tide gauges at Stony Point and Lorne do not record air temperature, water temperature and barometric pressure data and are not present in Figures 3,7,8,9,11,12,13 and 16. The tide gauge at Lorne does not record wind data and is not present in Figures 4, 5 and 6.

The *Monthly Data Report* is prepared by NTF Australia for Environment Australia. Staff members produce the text, plots and tables.

Further information on the *Monthly Data Report* and other projects conducted by NTF Australia can be obtained from the following address.

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Individuals and organisations are advised that quality controlled six-minute or hourly data from these stations are available on request from NTF Australia. Some handling fees may be charged. For commercial agencies requesting data, some additional costs may be levied.

Figure 1

**SEPTEMBER 2003
SIX MINUTE SEA LEVEL OBSERVATIONS (m)**

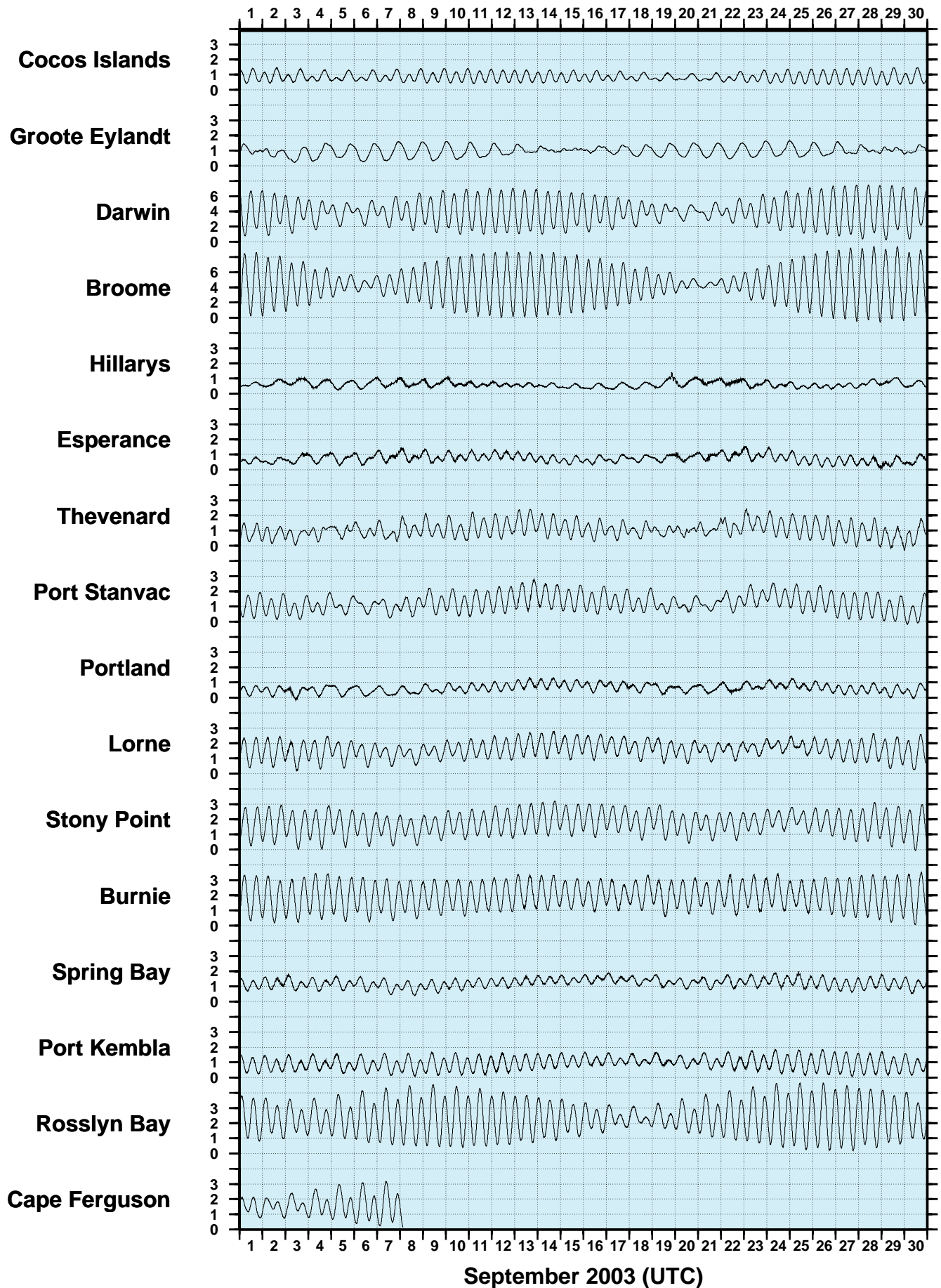


Figure 2

SEPTEMBER 2003
SIX MINUTE RESIDUAL WATER LEVELS (m)

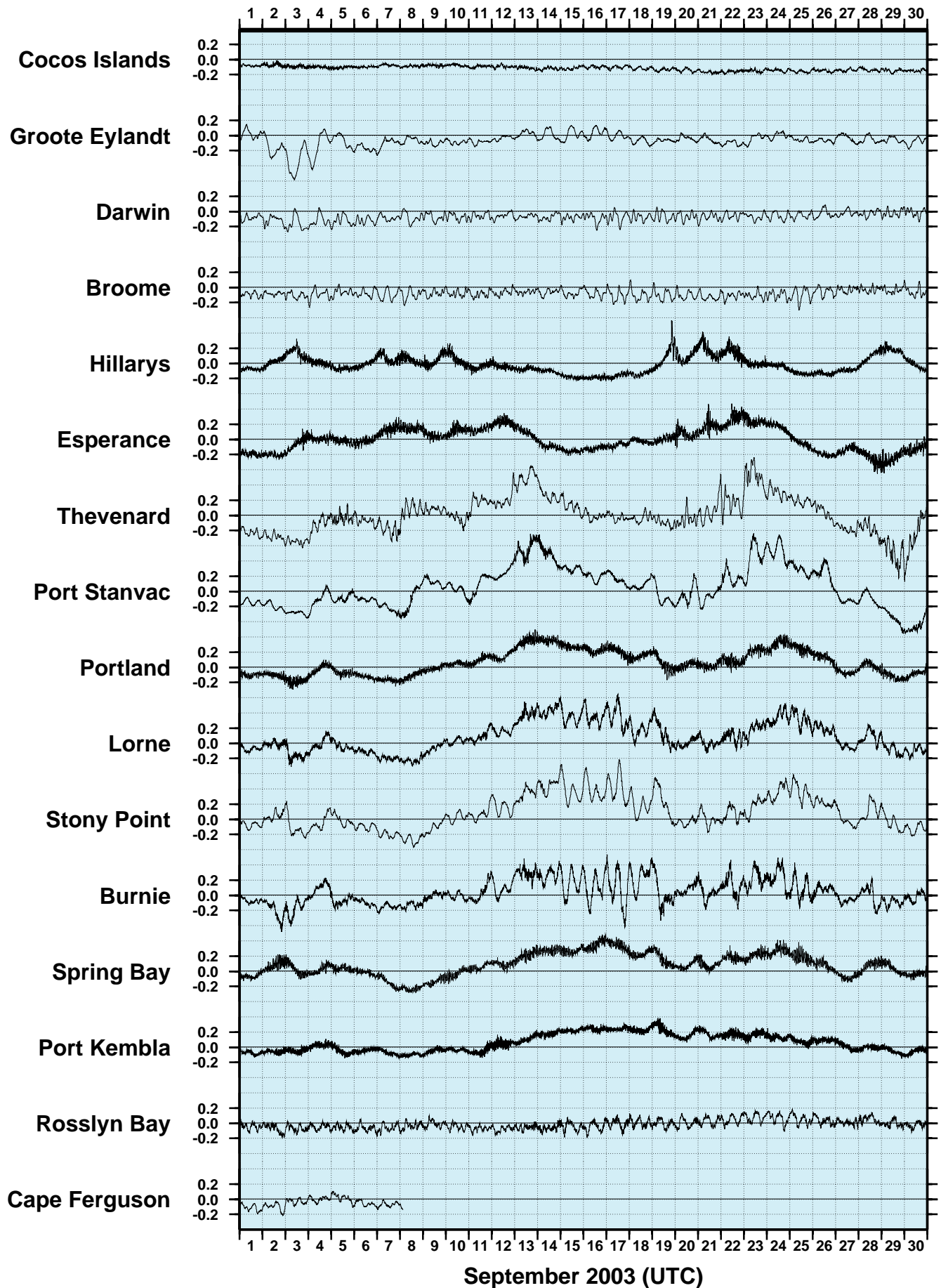


Figure 3
SEPTEMBER 2003
SIX MINUTE RESIDUALS
ADJUSTED FOR ATMOSPHERIC PRESSURE (m)

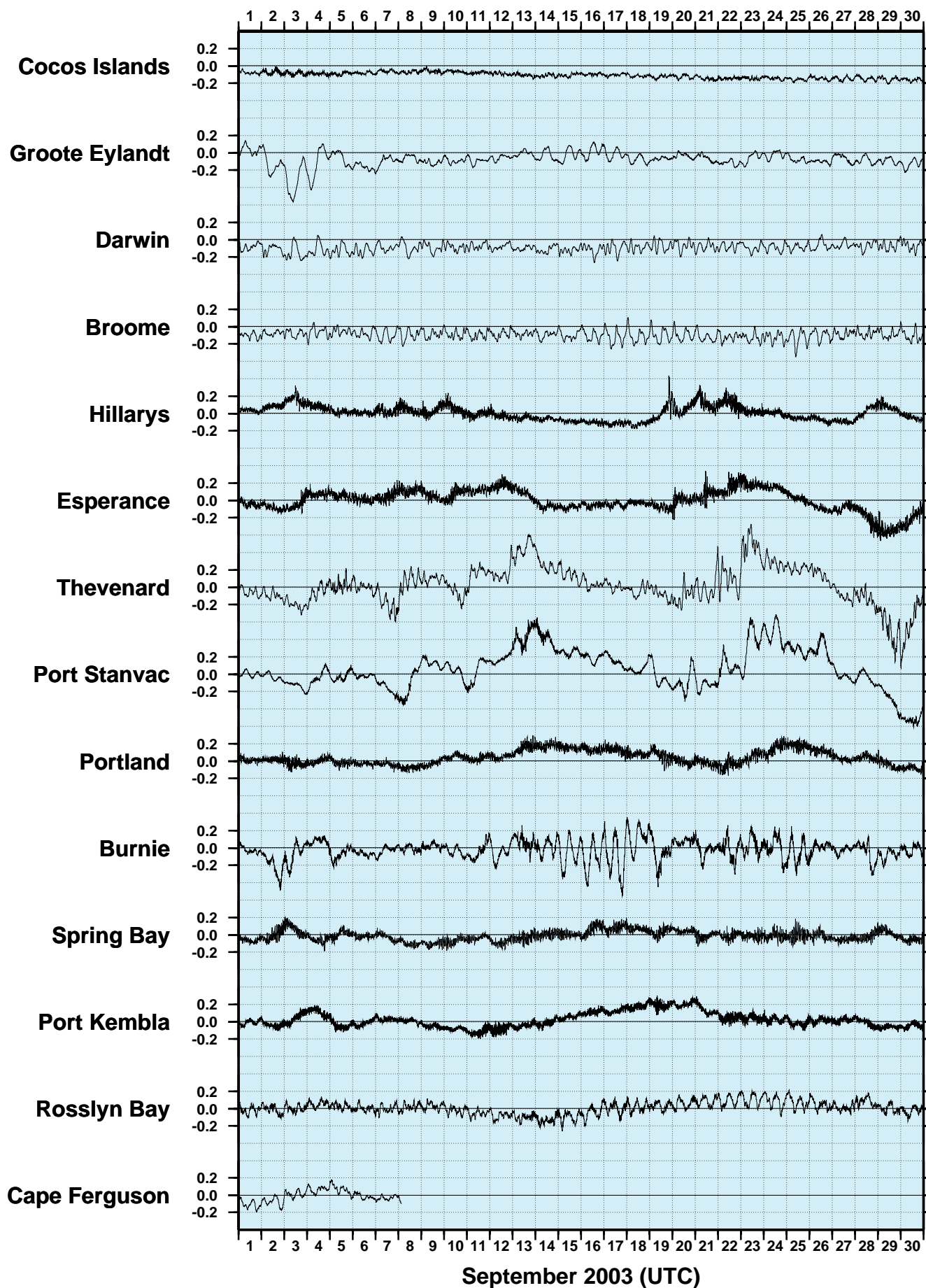


Figure 4

SEPTEMBER 2003
HOURLY WIND SPEEDS (m/s)

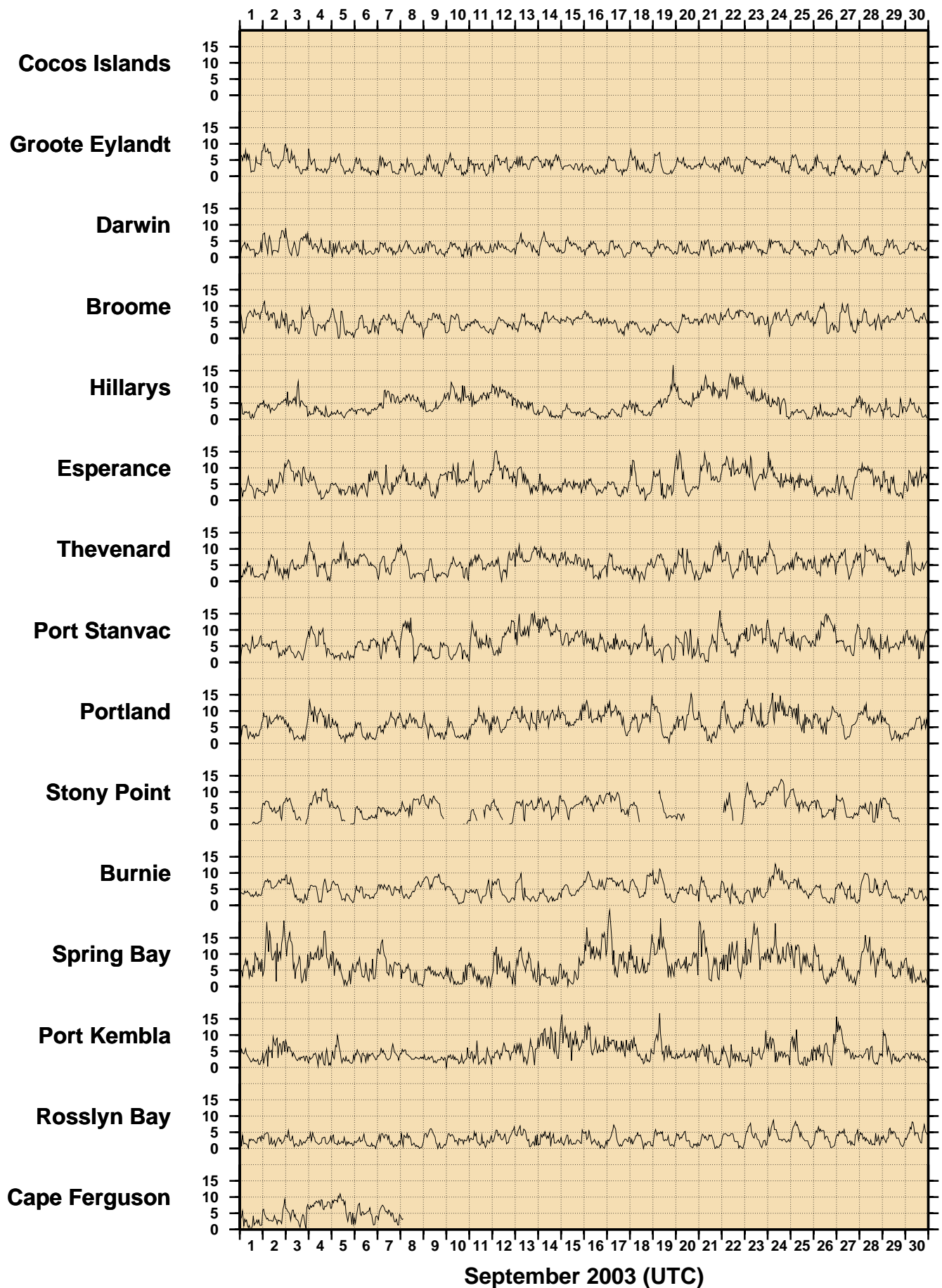


Figure 5

SEPTEMBER 2003
HOURLY INCIDENT WINDS (m/s, deg True)

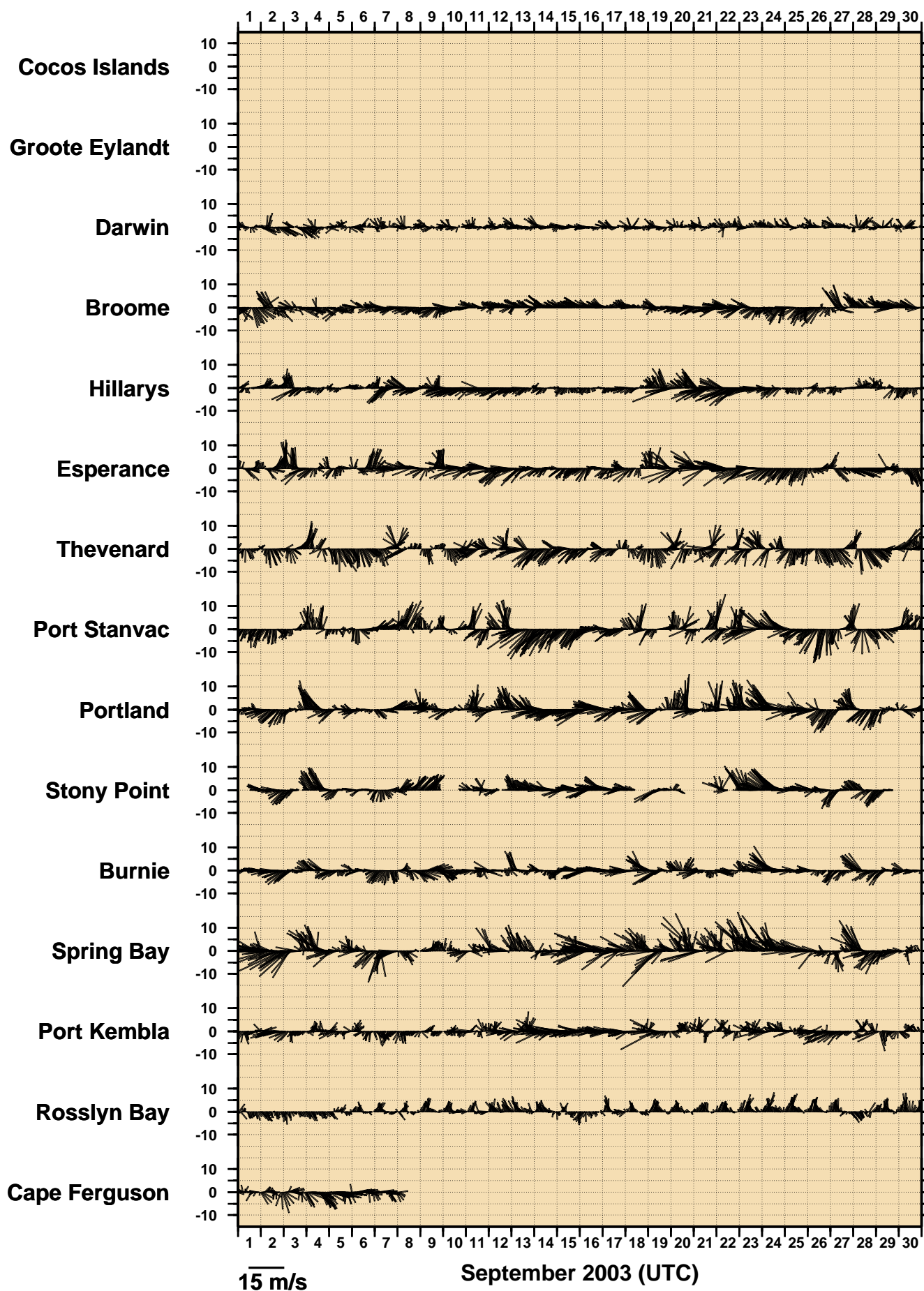


Figure 6

SEPTEMBER 2003
HOURLY MAXIMUM WIND GUSTS (m/s)

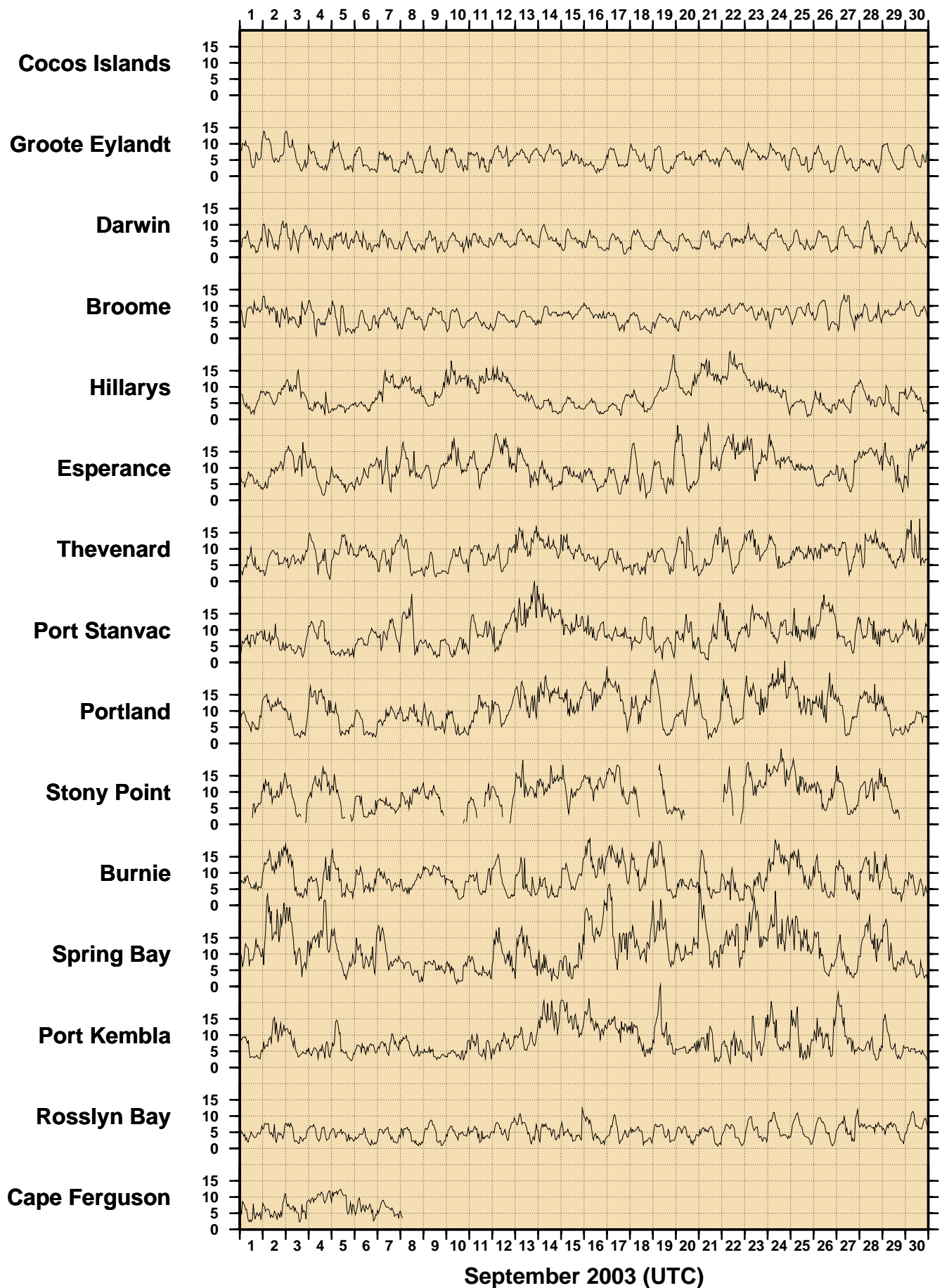


Figure 7

SEPTEMBER 2003
HOURLY AIR TEMPERATURES (°C)

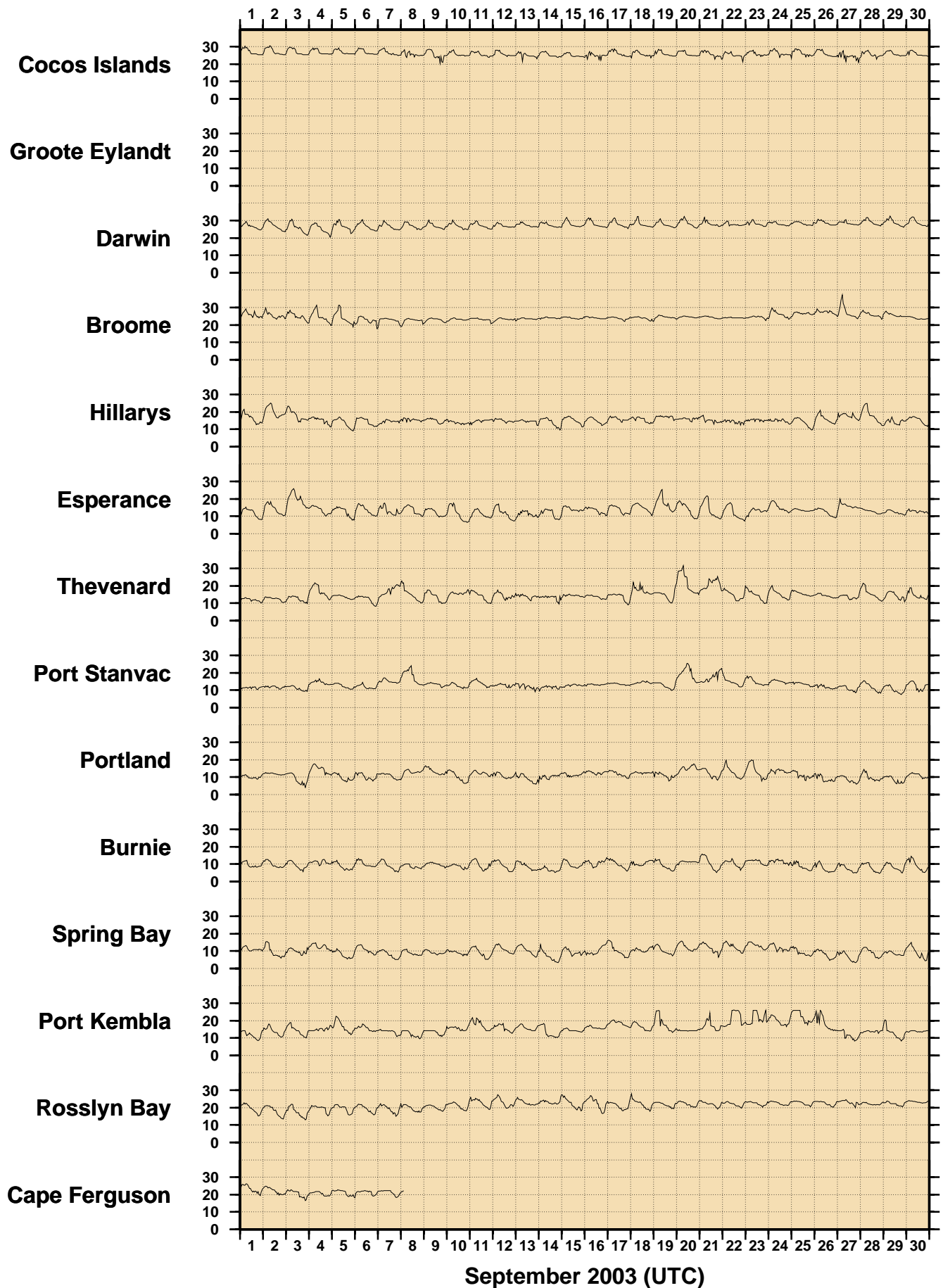


Figure 8

SEPTEMBER 2003
HOURLY WATER TEMPERATURES (°C)

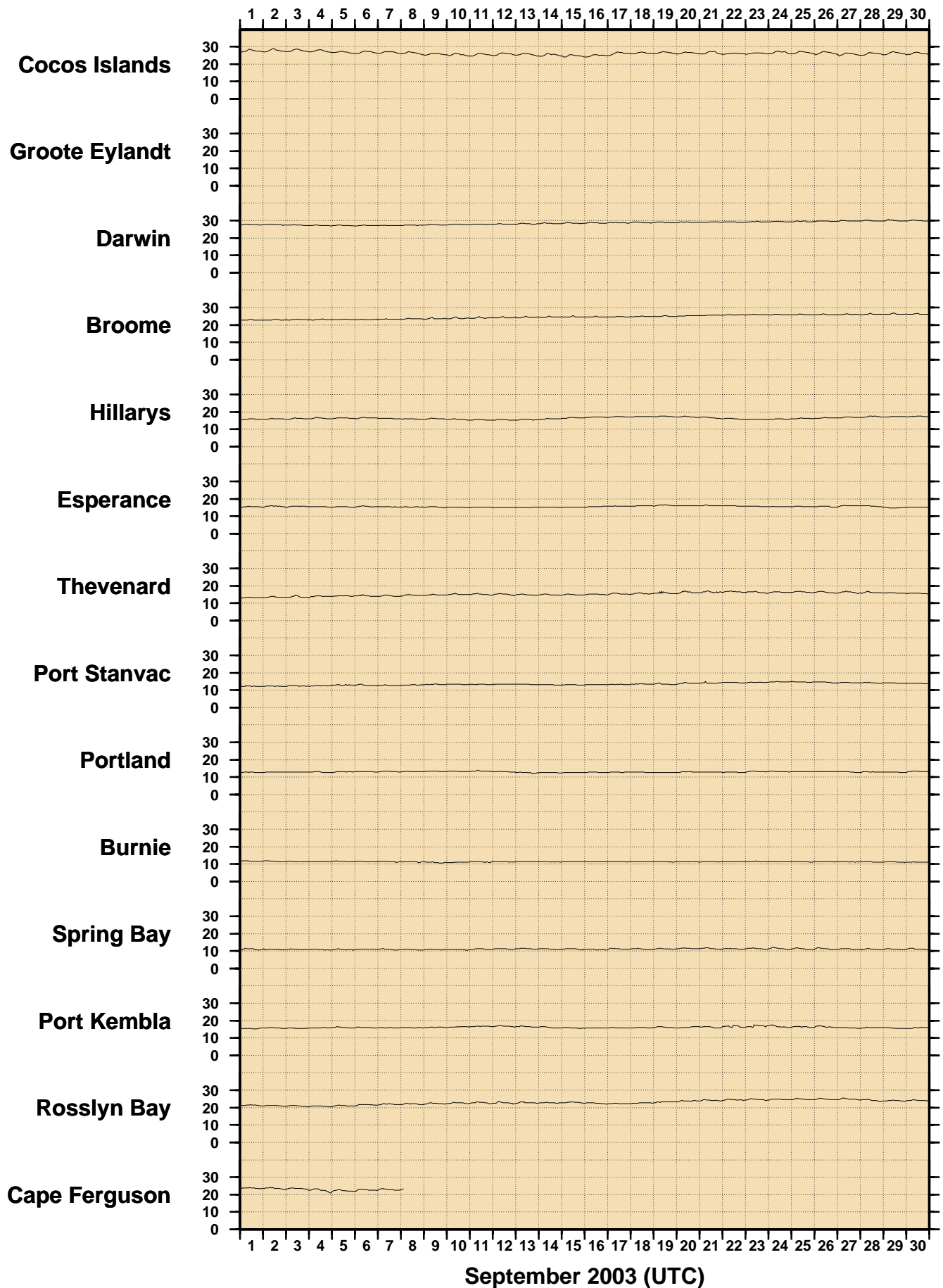


Figure 9

**SEPTEMBER 2003
HOURLY ATMOSPHERIC PRESSURE (hPa)**

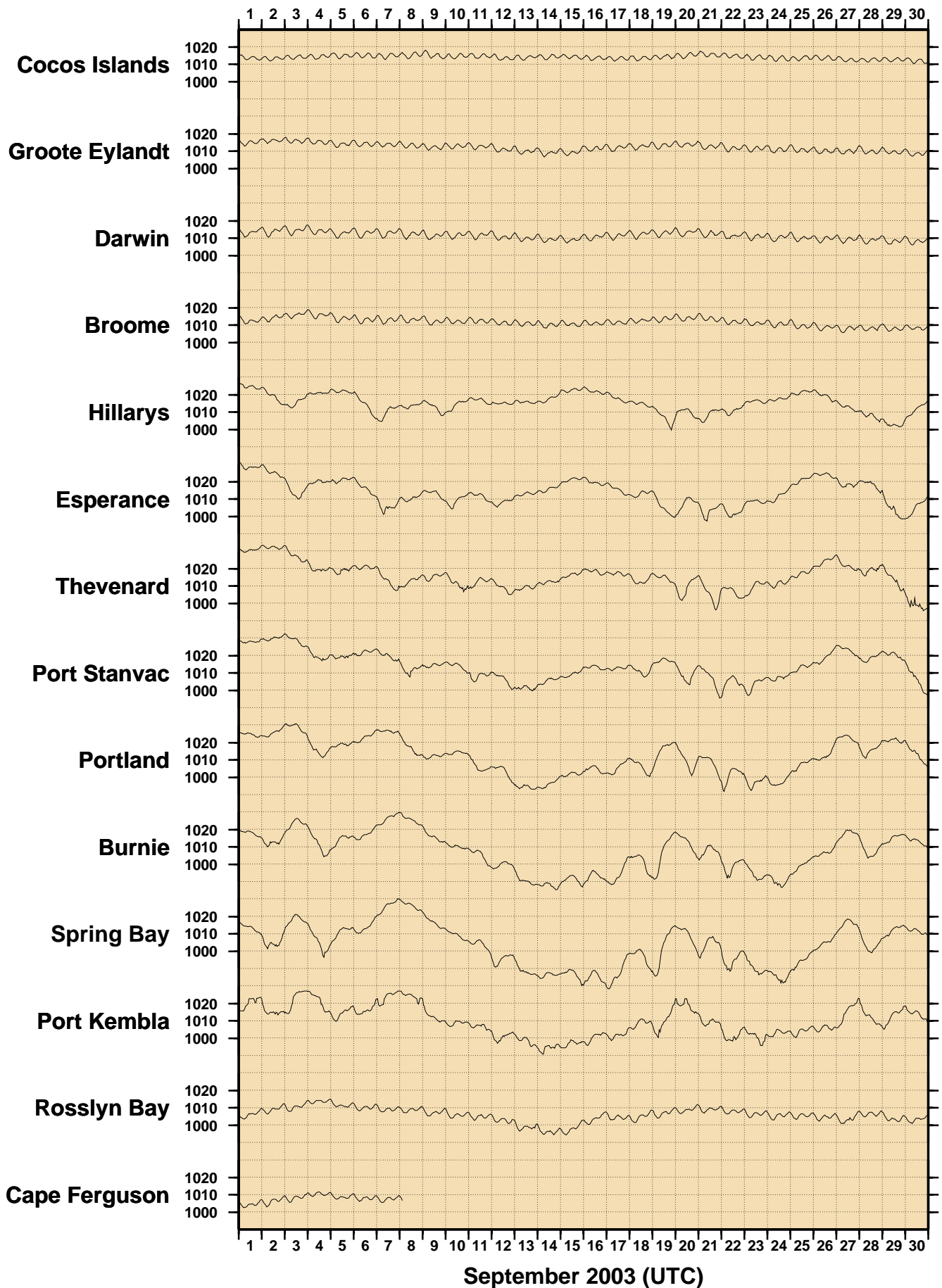


Figure 10
SEA LEVEL ANOMALIES THROUGH SEPTEMBER 2003 (m)

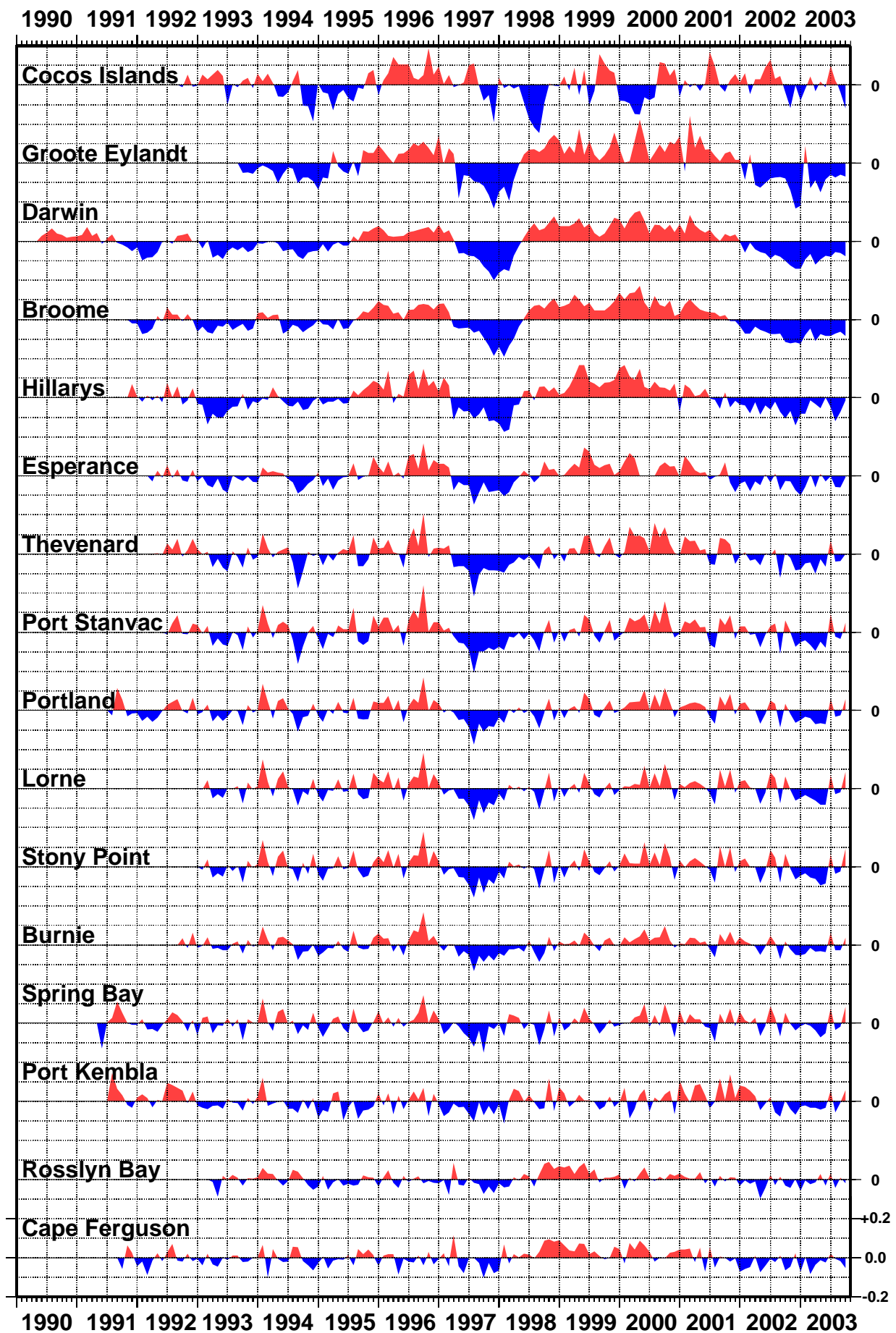


Figure 11

BAROMETRIC PRESSURE ANOMALIES THROUGH SEPTEMBER 2003 (hPa)

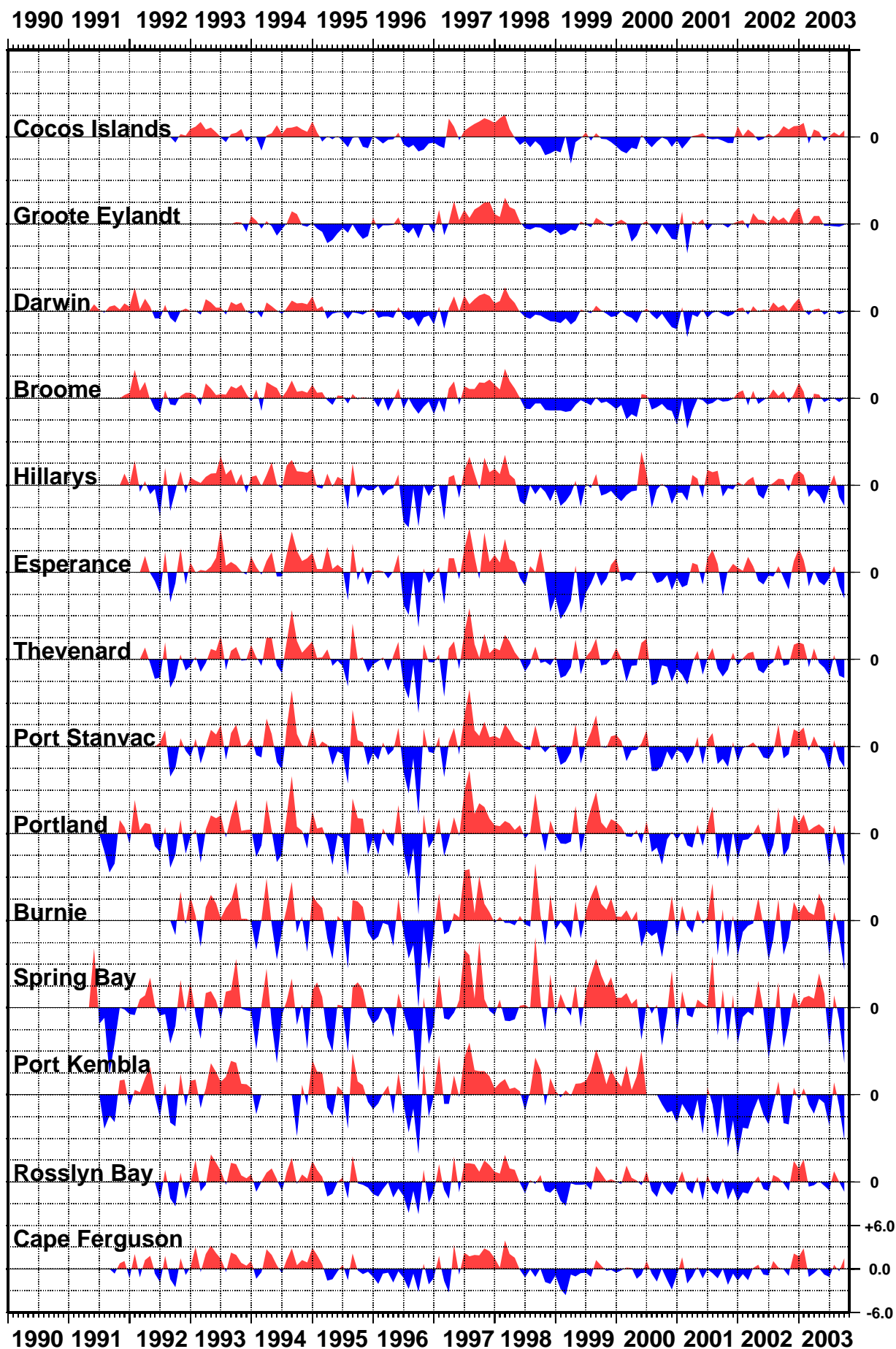


Figure 12

WATER TEMPERATURE ANOMALIES THROUGH SEPTEMBER 2003 (°C)

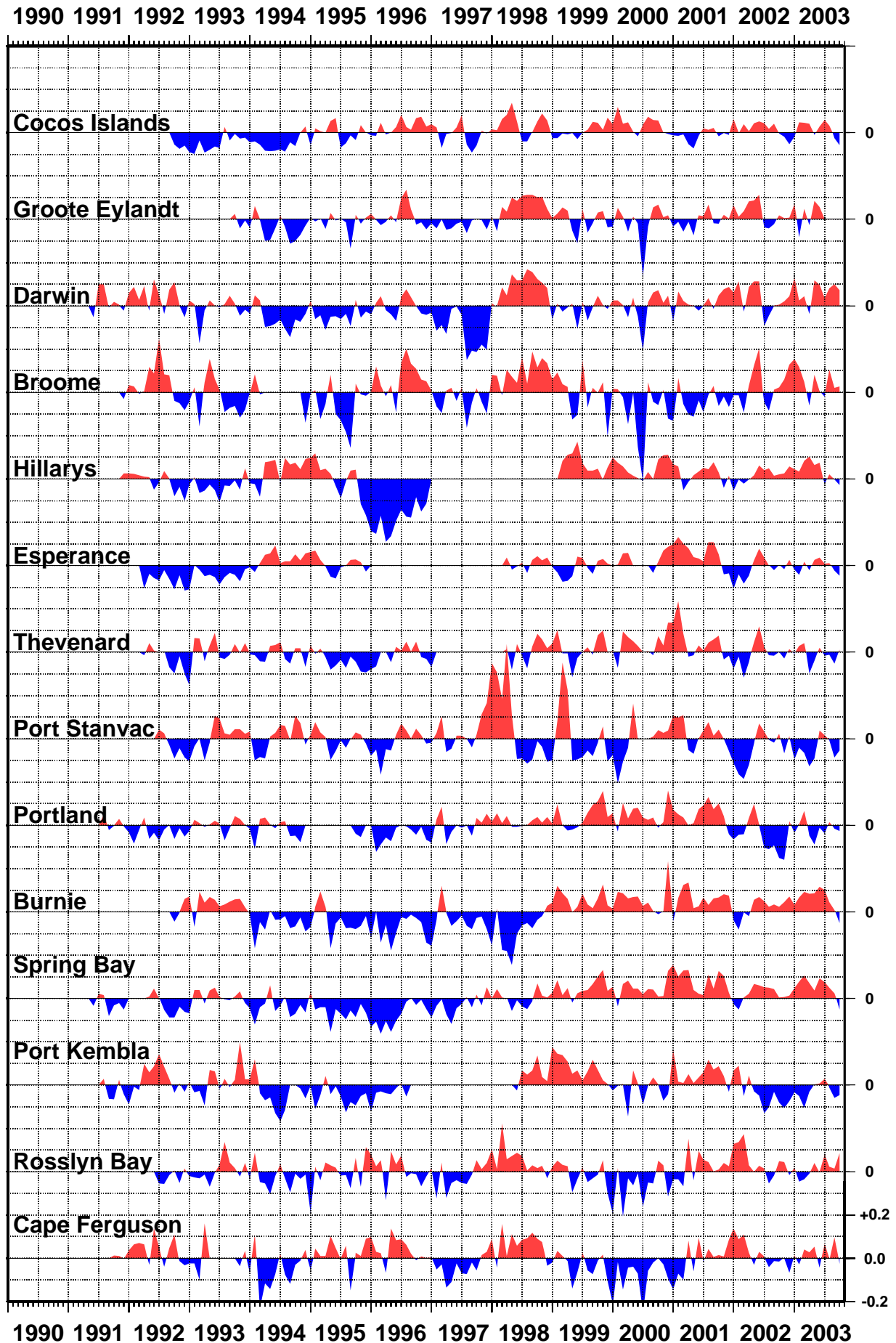


Figure 13
AIR TEMPERATURE ANOMALIES
THROUGH SEPTEMBER 2003 (°C)

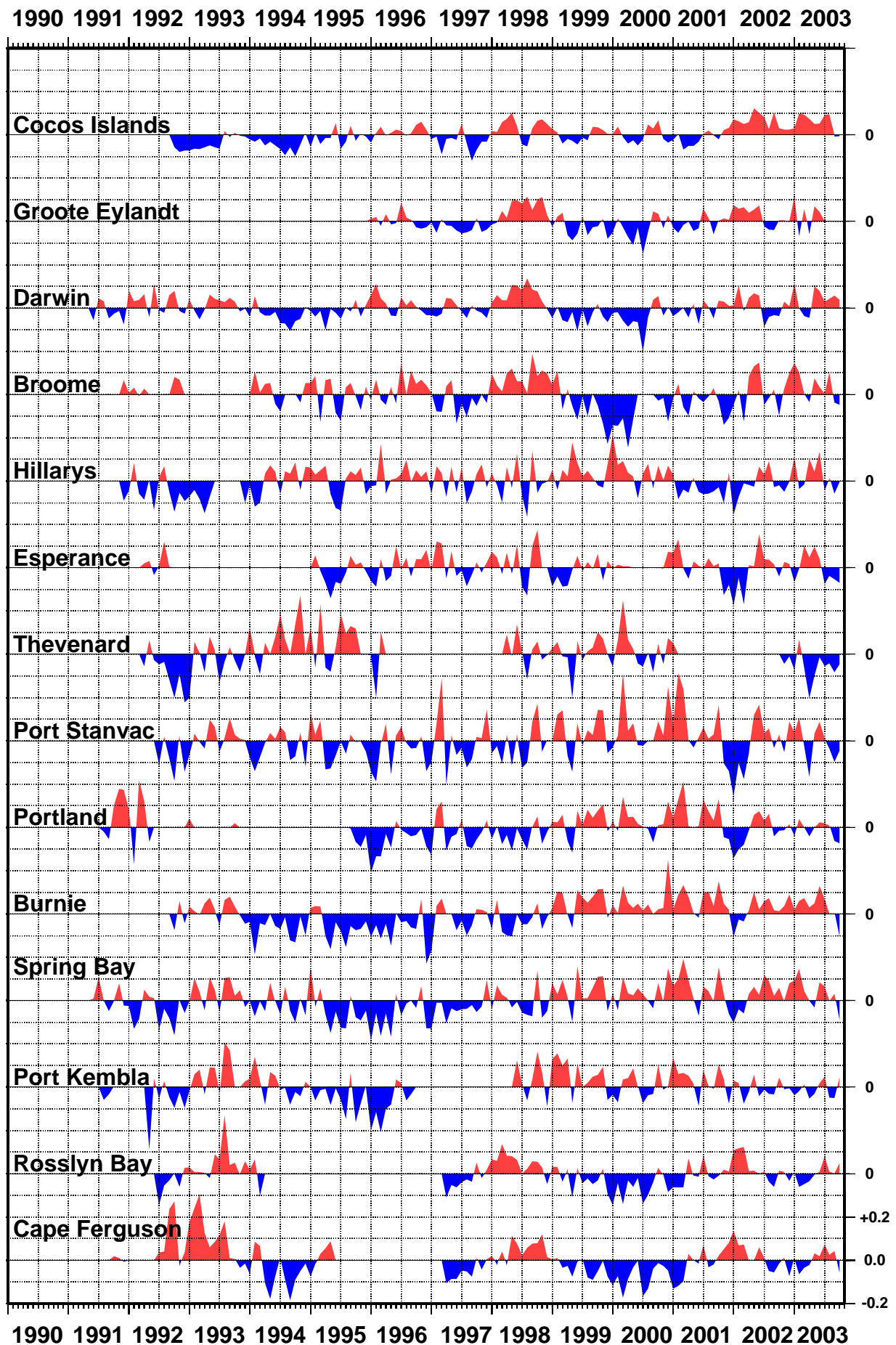
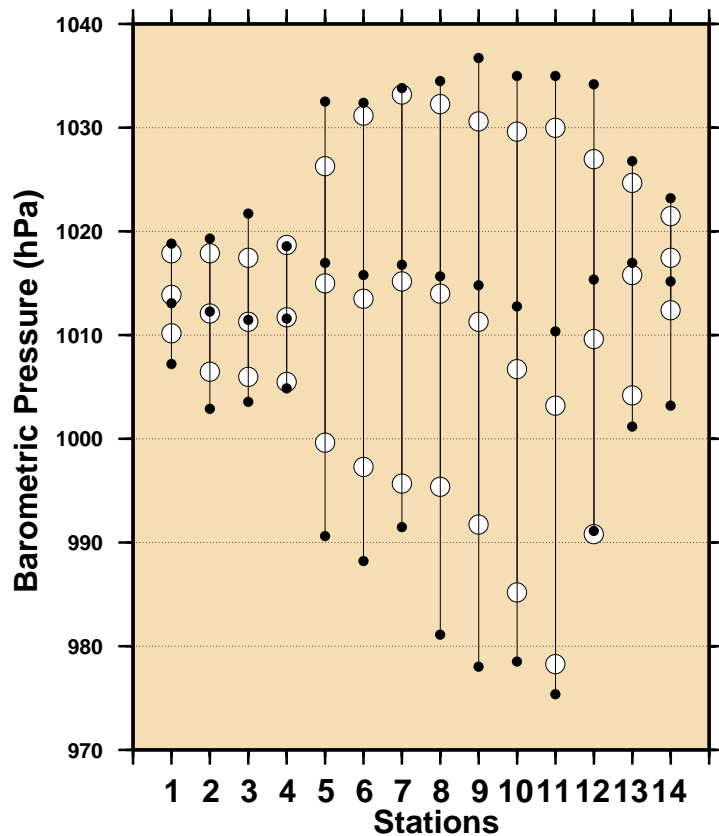
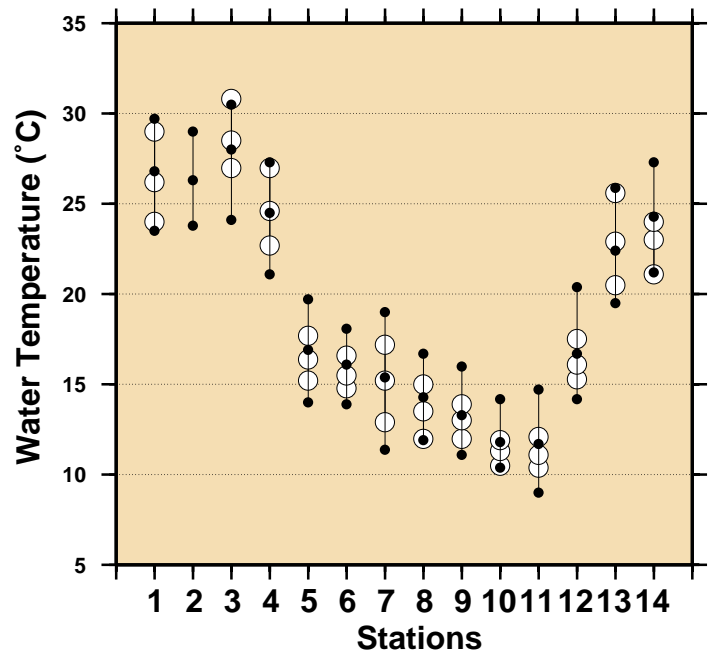
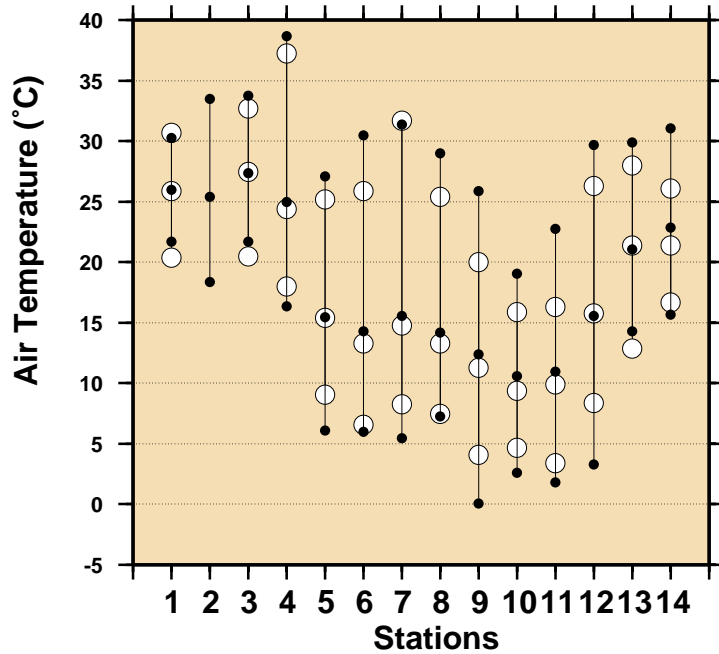


Figure 14
Comparison of September 2003 Max, Min & Mean with
Long Term September Values.



Stations

- 1 - Cocos Islands
- 2 - Groote Eylandt
- 3 - Darwin
- 4 - Broome
- 5 - Hillarys
- 6 - Esperance
- 7 - Thevenard
- 8 - Port Stanvac
- 9 - Portland
- 10 - Burnie
- 11 - Spring Bay
- 12 - Port Kembla
- 13 - Rosslyn Bay
- 14 - Cape Ferguson

- September 2003 Maximum
- September 2003 Mean
- September 2003 Minimum
- Long Term September Maximum
- Long Term September Mean
- Long Term September Minimum

Figure 15 SEA LEVEL DATA RETURN

THE NUMBER OF DAYS OF MISSING DATA ARE INDICATED
GAPS INCLUDE TRANSMISSION, POWER AND LOGGER FAILURE

* Patchy record

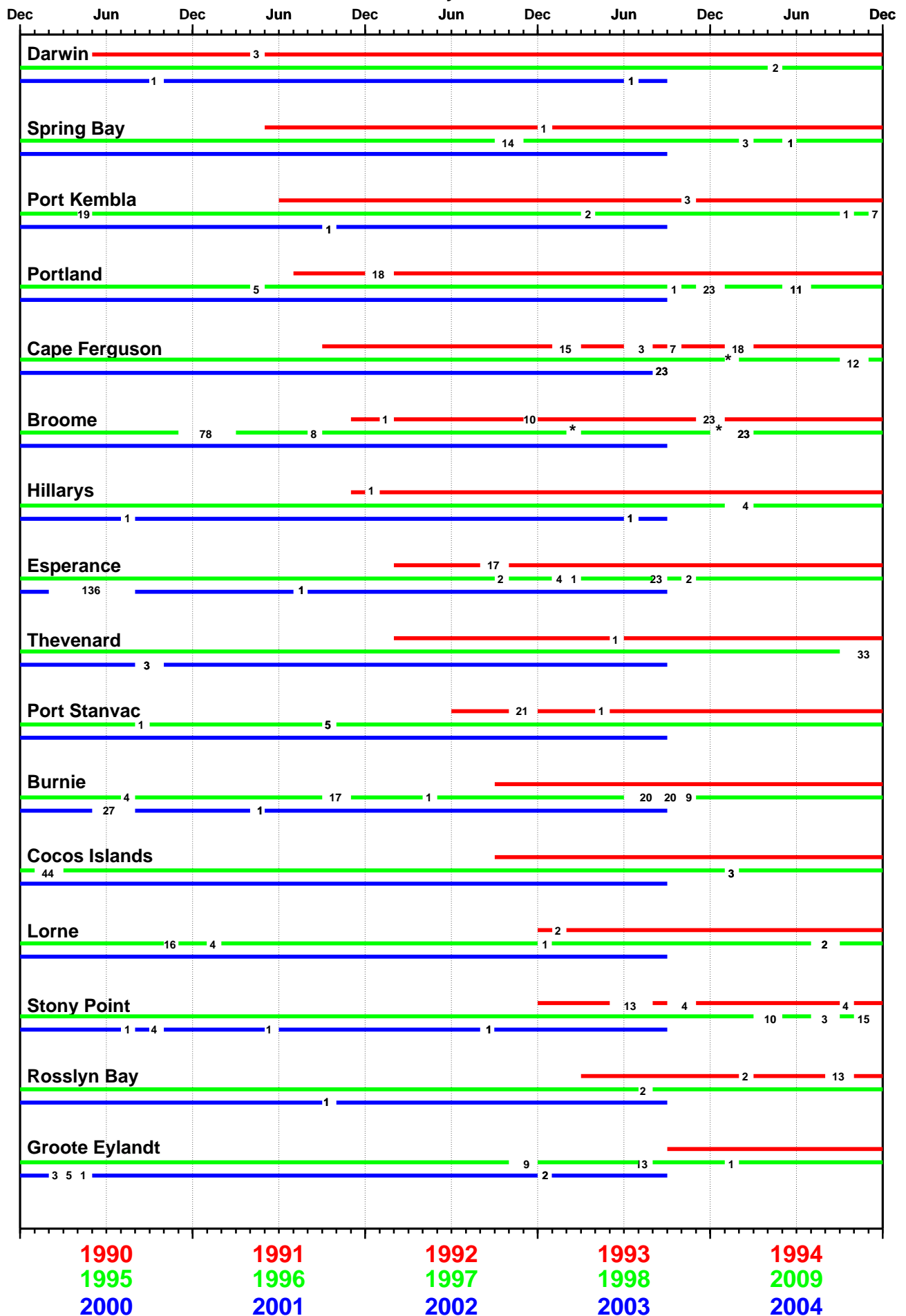


Figure 16

MONTHLY MEAN SEA LEVELS TO SEPTEMBER 2003 (m)

The zero line represents an arbitrary fixed offset from the zero of the tide gauge.

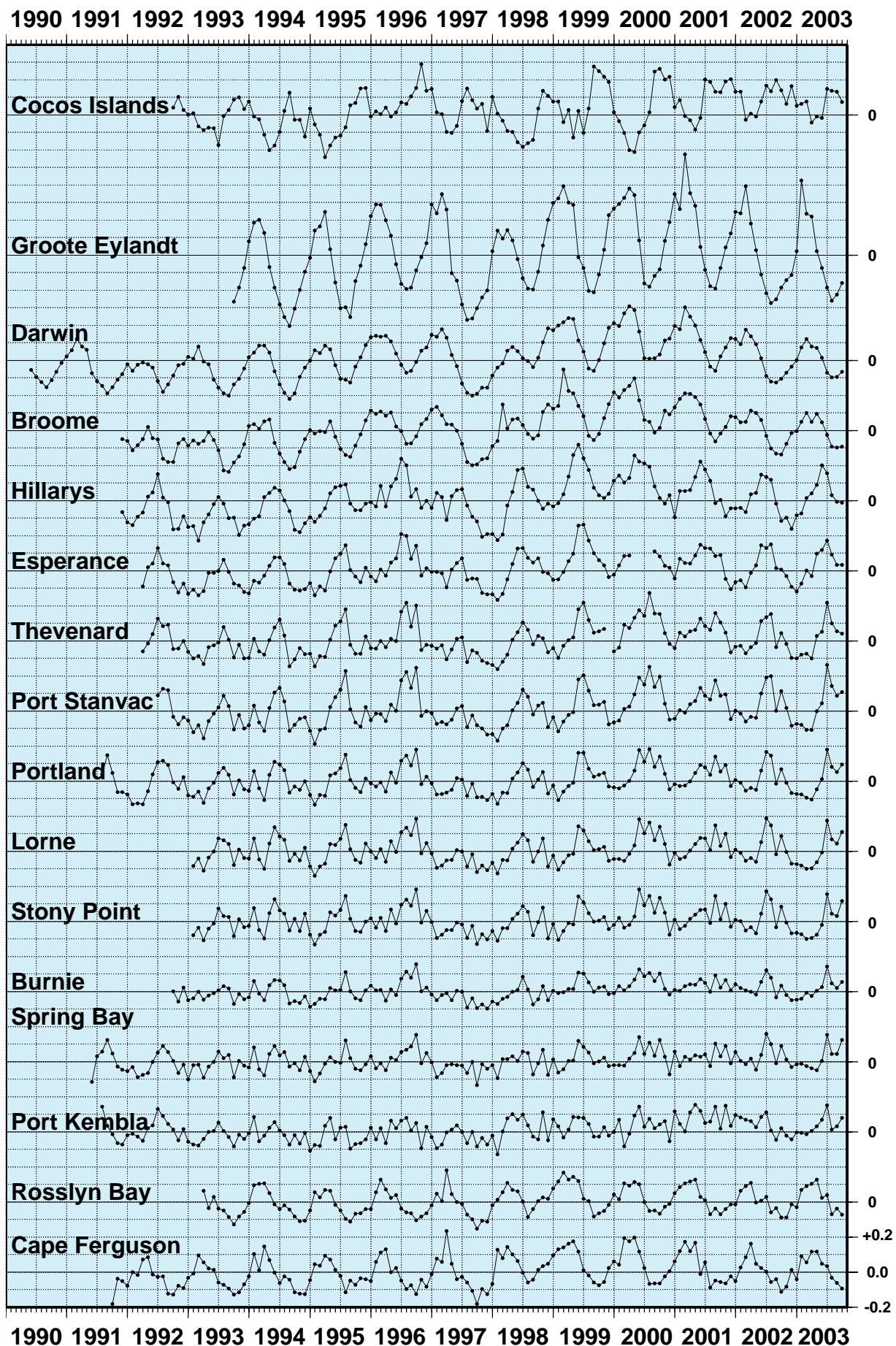


Figure 17

SEA LEVEL TRENDS THROUGH SEPTEMBER 2003 (mm/year)

